Teacher's Guide

Surviving Severe Weather in the United States

Overview

The purpose of this lesson is to provide students with a basic understanding of how to survive severe weather. This presentation will explain the impact of severe weather on our nation and what students can do to protect themselves from weather disasters. The lesson describes the Emergency Alert System (EAS) - our nations delivery system for weather and civil emergencies as well as homeland security.

Description of Slides

Slide 1. Weather is not always placid. Our country experiences a wide array of severe weather including; tornadoes, winter storms, hurricanes, droughts and heat waves.

Slide 2. The impact of weather on our nation is profound. Economically weather has a tremendous impact. The transportation, agricultural, and construction industries are significantly affected by weather.

Slide 3. America experiences more severe weather than any other country in the world. Most of this severe weather occurs in the Southeast United States.

Slide 4. The Southeast United States experiences so many severe storms because of it's geographic proximity to the Gulf of Mexico, the Rocky Mountains and the strong mid-latitude jet stream. The Gulf of Mexico supplies an abundance of low-altitude moisture, meanwhile, dry mid-altitude air travels east from the Rocky Mountains. When these two air masses are accompanied by a strong jet stream, or river of fast flowing air from the west, the result can be severe thunderstorms which producing large hail, damaging winds, flooding rains, and tornadoes.

Slide 5. Advanced warnings and forecasts are critical to the protection of life and property. United States citizens fund (through Congress) a vast infrastructure of weather forecasting technology. This technology is administered by the National

Weather Service (NWS).

The NWS Has 115 Doppler Radars across the country at each office. In addition the agency jointly utilizes Doppler Radars run by the Department of Defense.

The NWS has several satellites in orbit that are able to provide various pictures of the atmosphere. This includes Visible, Infrared, and Water Vapor to name a few.

THE NWS has an Upper Air network across the country that takes sample of the atmosphere twice a day. An instrument called a radiosonde is released via a balloon twice a day. Measurements including temperature, dewpoint, wind speed and direction, and pressure are taken at various heights from the surface to over 50,000 feet. This information is sent to NCEP (National Center for Environmental Predictions) and entered into numerical weather models that are run on super computers.

The Automated Surface Observing System (ASOS) is part of a nationwide network that takes real time weather measurements. This includes temperature, dewpoint, wind speed and direction, pressure, cloud cover and height, and present weather such as rain, snow, etc.

Each NWS office has a computer system called AWIPS that handles information coming into and going out of the office. The system also computes local applications for local weather occurrences. The system at each office is part of a nationwide network.

NOAA Weather Radio (NWR) is nationwide network of radio stations that continuously broadcasts weather information from the National Weather Service. NWR is the backbone of the Emergency Alert System.

Slide 6. Severe weather can strike in seconds. You must have a plan.

Slide 7: **Tornadoes - Part 2**

Slide 8. More people each year are killed by lightning or flash floods than tornadoes.

Slide 9. Because tornadoes strike so quickly receiving prompt warning and

knowing how to protect yourself is very important.

Slide 10. Average Number of tornadoes across the United States.

Slide 11. This photo shows the importance of sheltering on the lowest floor of a building.

Slide 12. This graph is for the United States. The peak season for tornadoes in the Mid-South is in March and April. A secondary maximum is in November.

Slide 13. An F3 tornado moved across Germantown TN on November 27, 1994 resulting in fatalities and considerable property damage.

Slide 14. Tornadoes can occur in any month of the year across the Mid-South. This slide shows the number of tornadoes that occurred in January 1999.

Slide 15. An F4 tornado moved across Clay County AR on January 21, 1999. Fortunately, this tornado remained over rural areas. This tornado was part of a tornado outbreak during the week of January 17, 1999.

Slide 16. Dr. Theodore Fujita, meteorology professor from the University of Chicago, developed the widely used tornado classification scheme.

Slide 17. This graph shows that more deaths occur with the strongest tornadoes, F4 or greater, even though F4 or greater tornadoes comprise the lowest number of total tornadoes.

Slide 18. These numbers are casualties, which are both killed and injured by tornadoes each year.

Slide 19. A Tornado or Severe Thunderstorm watch means that conditions are favorable for tornadoes or severe thunderstorms. It does not mean that these weather events are occurring.

Slide 20. A Tornado or Severe Thunderstorm warning means that a tornado or severe thunderstorm has been detected on Doppler radar or has been spotted by an observer. Take action now.

Slide 21. Plan a shelter.

Slides 22-23. Mobile homes and automobiles are inadequate shelter from tornadoes.

Slide 24-29. These slides address common tornado myths. The misconception that sheltering in an overpass is safe led to some people losing their lives during the May 3, 1999 tornado outbreak in Oklahoma City.

Slide 30-31. This map shows where the best locations are in your home to shelter from a severe storm.

Slide 32. In a church, business or school the best location to find shelter is in a hall away from glass.

Slide 33. Avoid large rooms such as, gymnasiums, the church sanctuary, or the school swimming pool.

Slide 34. Evacuate portable school rooms. They are like mobile homes and do not supply adequate shelter.

Slide 35. Plan ahead to survive.

Slide 36. This slide asked which severe weather element causes the most damage as well as loss of life in the United States. The answer is flooding.

Slide 37. **Flash Floods - Part 3**

Slide 38. Floods are called the master of surprise due to how rapid water can rise and how complacent people take their occurrence.

Slide 39. Floods kill near twice as many people each year than tornadoes.

Slide 40. The Economic damage due to floods is incredible.

Slide 41-43. The Fort Collins, Colorado flash flood of July 1997 is an example of a typical killer flash flood. We have had similar situations in the Mid-South, most recently in November 2001.

Slide 44-45. Flash Flood safety rules.

Slide 46. Lightning - Part 4

Slide 47-51. Lightning kills more each year than tornadoes.

Slide 52. Thunderstorms Winds - Part 5

Slide 53. The National Weather Service has a specific definition of a severe thunderstorm. It is based on hail size and wind speed. The amount and intensity of lightning is not included in this definition.

Slide 54. Downbursts are relatively common, more so than tornadoes. Downbursts cause more damage each year than tornadoes. Downbursts are caused by cold air, descending quickly to the ground. Downbursts can produce winds that are equivalent to those produced by a moderate sized tornado.

Slide 55. Examples of downbursts by looking at clouds.

Slide 56. A sequence of photos depicting a downburst in action.

Slide 57. Squall lines cause more widespread damage than any other type of thunderstorm complex.

Slide 58. This is a Doppler Radar sequence shows a squall line approaching a community. Note the sharp reflectivity gradient from the strong red color to no radar echo. The "bowing" of the radar echo indicates a strong potential for damaging wind.

Slide 59. Wind damage resulting from downbursts or squall lines can be devastating and are often mistaken for tornado damage.

Slides 60-61. Hail safety rules.

Slide 62. **NOAA Weather Radio - Part 6**

Slide 63. How does one receive notification of severe weather warnings? NOAA Weather Radio, commercial television and radio, as well as the internet are excellent resources.

Slide 64. The internet provides continuous weather updates.

Slide 65. The Emergency Alert System or EAS is the nation's warning system for severe weather, civil emergencies and enemy attack. NOAA Weather Radio provides the backbone for EAS with its tone alert capability.

Slides 66-67. A description of NOAA Weather Radio.

Slide 68. The contents of the disaster kit.

Slide 69. These are the most common severe weather elements in the Mid-South.

Slide 70. You must plan ahead.

Slide 71. End.